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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,710	03/10/2004	Michael E. Yoder	200314971-1	6166

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EXAMINER	
BRADLEY, MATTHEW A	
ART UNIT	**PAPER NUMBER**
2187	

MAIL DATE	DELIVERY MODE
06/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/798,710	YODER, MICHAEL E.	
	Examiner	Art Unit	
	Matthew Bradley	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7,9-11,13-15,18 and 22-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-7, 9-11, 13-15, 18, and 22-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 19 April 2007 has been entered.

Claim Status

Claims 1, 3-7, 9-11, 13-15, 18, and 22-24 remain pending and are ready for examination.

Claim Objections

Claim **13** is objected to because of the following informalities: Claim 13 presently contains amendments indicating dependence off of presently cancelled claim 12. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims **1**, **3-4**, **7**, and **9-10** are rejected under 35 U.S.C. 102(b) as being anticipated by Grigor et al (U.S. 6,023,281), hereinafter referred to as Grigor.

As per independent claim **1**, Grigor teach, receiving a locality request from a virtual memory fault handler, the locality request including an indication of a search policy to use from among a plurality of search policies; forming a data structure based on physical memory localities within the system and the search policy that was indicated, said data structure including sets of equidistant physical memory localities; and selecting a preferred physical memory locality using a pointer to a locality within said data structure (Column 4 lines 33-62: taught as the multiple processors of Grigor each having their own allocation set and requesting allocation of memory therefrom. The first processor and the second processor has a address set 'data structure' in addition to a method 'search policy' that is used for allocation of memory to that specific processor thus anticipating the instant limitation of a plurality of search policies)

As per dependent claim **3**, Grigor teach, wherein the physical memory localities include local memories at cells in the system (Figure 1 as taught in Column 2 lines 30-56).

As per dependent claim **4**, Grigor teach, wherein the plurality of search policies includes a "closest first" policy (Column 4 lines 45-51: taught as the incrementing of physical locations, thus the closest available address for subsequent allocation is an increment from the last allocation).

As per dependent claim **7**, Grigor teach, wherein the selection of the preferred locality is performed using a get "best"/"next best" iteration procedure (Column 3 lines 32-40).

As per dependent claim **9**, Grigor teach, wherein the determination of the preferred locality includes changing to a next equidistant set if there is no memory available in any locality of a current equidistant set (Column 4 line 63 to Column 5 line 2).

As per dependent claim **10**, Grigor teach, further comprising returning an indication that no locality is available if no locality within any of the equidistant sets has sufficient memory (Column 5 lines 2-3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **5** and **6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigor and in view of Horstmann et al (U.S. 6,125,433), hereinafter referred to as Horstmann. (The Microsoft Computer Dictionary Fifth Edition is used as evidentiary support).

As per dependent claim **5**, Grigor teach the limitations as noted supra.

Grigor does not explicitly teach, wherein the physical memory localities further includes interleaved memory in the system.

Horstmann teaches, wherein the physical memory localities further includes interleaved memory in the system (Column 1 lines 57-67).

Grigor and Horstmann are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Grigor and Horstmann before him/her to combine the interleaved allocation of Horstmann with Grigor for the benefit of reducing wait states and using available memory efficiently.

The suggestion for doing so would have been that, interleaved allocation provides an efficient use of main memory. For example, a process's main memory allocation need not be contiguous; processes in main memory can be interleaved (Column 1 lines 61-64 of Horstmann). Further, in the Microsoft Computer Dictionary, interleaved memory is defined as a method of organizing addresses in RAM memory in order to reduce wait states. Given this ordinary definition, it would have been obvious to implement interleaved memory into Grigor to further improve the allocation methods of Grigor.

Therefore, it would have been obvious to combine Grigor with Horstmann for the benefit of interleaved memory to obtain the invention as specified in claims 5 and 6.

As per dependent claim **6**, the combination of Grigor and Horstmann teach, wherein the plurality of search policies includes an "interleaved first" type of policy (Column 1 lines 61-64 of Horstmann).

Claims **11**, **22**, and **24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigor and in view of Koenen (U.S. 2004/0019891), hereinafter referred to as Koenen.

As per independent claim **11**, the combination of Grigor and Koenen teach,

- multiple symmetric multiprocessing (SMP) nodes; (Figure 1 as described in Paragraphs 0019-0021 of Koenen)
- multiple central processing units (CPUs) at each SMP node; (Figure 1 as described in Paragraphs 0019-0021 of Koenen)
- a memory control unit at each SMP node which is coupled to each CPU at that SMP node; (Figure 1, items 12I, 14I, and 16I as described in Paragraphs 0019-0021 of Koenen)
- shared memory at each SMP node which is accessible by way of the memory control unit at that SMP node; (Figure 1, items 12H, 14H, 16H, as described in Paragraphs 0019-0021 of Koenen)
- a switching system coupled to the memory control units so as to interconnect the multiple SMP nodes; (Figure 1, item 18 as described in Paragraphs 0019-0021 of Koenen)
- an operating system running on the CPUs; (Paragraph 0027, taught as 'the O/S' of Koenen)
- a virtual memory (VM) fault handler within the operating system; and (Paragraph 0047 of Koenen)
- a VM locality module within the operating system; wherein the VM locality module is configured to receive a locality request from the VM fault handler, the locality request including an indication of a search policy to use from among a plurality of search policies, and is further configured to

form a data structure based on the search policy that was indicated (Column 4 lines 33-62 of Grigor with respect to the comments made supra in independent claim 1).

Grigor teach a multiple processor system, but does not explicitly teach the hardware components that are found in Koenen which is relied upon as noted supra.

Grigor and Koenen are from the same field of endeavor, namely memory allocation for multiple processor computing systems.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Grigor and Koenen before him/her to combine the allocation scheme of Grigor with Koenen for the benefit of allowing allocated blocks to remain contiguous. As both systems teach multiple processor allocation, the allocation scheme of Grigor would be beneficial to Koenen for the reason noted.

The suggestion for doing so would have been that, sharing memory in this manner allows the memory allocation to each of the processors to be flexible and the allocated blocks remain contiguous (Column 2 lines 25-29 of Grigor).

Therefore, it would have been obvious to combine Grigor with Koenen for the benefit of Grigor's allocation scheme to obtain the invention as specified in claims 11, 22, and 24.

As per independent claim **22**, the combination of Grigor and Koenen teach, a virtual memory manager configured for extending a memory space beyond limits of a physical address space; a virtual memory fault handler configured to interrupt execution of the virtual memory manager when a page fault occurs; and a virtual memory locality

module configured to receive a locality request from the virtual memory fault handler, to form a data structure having sets of equidistant physical memory based on a search policy indicated in the locality request, and to rapidly select a physical memory locality in the system using a pointer to the data structure (the Examiner incorporates herein the rejections made supra with respect to claims 1 and 11).

As per dependent claim **24**, the combination of Grigor and Koenen teach, wherein the VM locality module is further configured to determine a preferred locality using a pointer to a locality within the data structure (Paragraph 0052 of Koenen).

Claims **13-15** and **18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigor and in view of Koenen and further in view of Horstmann et al (U.S. 6,125,433), hereinafter referred to as Horstmann. (The Microsoft Computer Dictionary Fifth Edition is used as evidentiary support).

As per dependent claim **13**, the combination of Grigor and Koenen teach wherein the shared memory includes both local memory and wherein the plurality of search policies include at least a closest first search policy y (Grigor as shown in dependent claim 4 above as well as Horstmann Column 1 lines 57-67).

Grigor does not explicitly teach, an interleaved memory or an interleaved first search policy.

Horstmann teaches, wherein the shared memory includes interleaved memory, and wherein the plurality of search policies include an interleaved first search policy (Horstmann Column 1 lines 57-67).

The combination of Grigor and Koenen, and Horstmann are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Grigor, Koenen, and Horstmann before him/her to combine the interleaved allocation of Horstmann with Grigor and Koenen for the benefit of reducing wait states and using available memory efficiently.

The suggestion for doing so would have been that, interleaved allocation provides an efficient use of main memory. For example, a process's main memory allocation need not be contiguous; processes in main memory can be interleaved (Column 1 lines 61-64 of Horstmann). Further, in the Microsoft Computer Dictionary, interleaved memory is defined as a method of organizing addresses in RAM memory in order to reduce wait states. Given this ordinary definition, it would have been obvious to implement interleaved memory into Grigor and Koenen to further improve the allocation methods of Grigor and Koenen.

Therefore, it would have been obvious to combine Grigor and Koenen with Horstmann for the benefit of interleaved memory to obtain the invention as specified in claims 13-15 and 18.

As per dependent claim **14**, the combination of Grigor and Koenen, and Horstmann teach, wherein the data structure for the closest first search policy comprises a first set including a closest local memory locality and one or more other sets of equidistant localities (Column 4 line 63 to Column 5 line 2 of Grigor).

As per dependent claims **15** and **18**, the combination of Grigor and Koenen, and Horstmann teach, wherein the physical memory localities further includes interleaved memory in the system (Column 1 lines 61-64 of Horstmann).

Claim **23** is rejected under 35 U.S.C. 103(a) being unpatentable over Grigor and in view of Elnozahy et al (U.S. 6,701,421), hereinafter referred to as Elnozahy,

As per dependent claim **23**, Grigor does not explicitly teach, wherein the pointer is rotated amongst localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities.

Elnozahy teaches, wherein the pointer is rotated amongst localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities (Column 6 line 63 to Column 7 line 5).

Grigor and Elnozahy are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Grigor and Elnozahy before him/her to combine the round robin allocation scheme of Elnozahy with Grigor for the benefit of equal portion allocation on each node.

The suggestion for doing so would have been that, in a striped allocation policy, blocks of address space are allocated among the nodes in a rotating manner such that a portion of the allocated memory resides on each of the nodes (Column 6 lines 63-67 of Elnozahy).

Therefore, it would have been obvious to combine Grigor with Elnozahy for the benefit of equal portion allocation to each node to obtain the invention as specified in claim 23.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. U.S. 6,785,888 McKenney et al teach a memory allocator in a multiprocessor computer system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Bradley whose telephone number is (571) 272-8575. The examiner can normally be reached on 6:30-3:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A. Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRP/mb MB

Brian R. Peugh
Primary Examiner
10/25/05